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CIMEX LECTULARIUS L. (HEMIPTERA: CIMICIDAE) – RETURN IN ROMANIA

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Abstract
Cimex lectularius is an ectoparasitic species with a cosmopolitan distribution adapted to a temporarily obligate hematophagous lifestyle. Common presence throughout the world until the beginning of the 1950s, the bed bug has no longer been reported in the following decades as a result of its populations being managed with DDT, Romania becoming the largest producer of this insecticide at the European level. If the first reports regarding the recent return of the species in Europe date back to the end of the 90s, the reports are more recent in Romania. An analysis of the YouTube platform regarding bed bugs in our country revealed the first record in 2013. In Pitesti, the species was recorded for the first time in 2019, with an increase in the number of infestation cases in recent years. The increase of tourism and international trade, the main factors favouring the spread of the species, call for new measures necessary to prevent and control the spread of the bed bug, and ensure public health.

Keywords: bed bug, infestation, public health, Romania

1. INTRODUCTION

The family Cimicidae consists of more than 100 species adapted to a temporarily obligate hematophagous lifestyle on homeothermic hosts, most species known as ectoparasites of humans, bats, and bird species, and occasionally reported on reptiles (Berenger and Parola, 2017). The genus *Cimex* is represented by 23 described species, two of which, *Cimex lectularius* L. and *C. hemipterus* (F.), are strictly related to humans. The two species differ in morphological criteria and geographic range, with the species *C. hemipterus* being attached to tropical and subtropical areas, while the cosmopolitan *C. lectularius* predominates in temperate zones. Also, five other *Cimex* species may occasionally feed on humans (Usinger, 1966; Krinsky, 2019; Hamlili et al., 2023). Recently, the tropical species *C. hemipterus* has been recorded in Florida (Krinsky, 2019), Italy (Masini et al., 2020) and Paris (Chebbah et al., 2021).

It is hypothesized that the parasitic relationship between humans and the bed bugs dates back to the period of cohabitation in caves of the primitive humans with bats, almost 200 000 years ago, when the climate was warm and dry (Usinger, 1966; Akhoundi et al., 2020).

Recent research at an archaeological site from the Workmen's Village, Amama (Egypt), site dating back to 1352-1336 BC, has revealed fossil specimens of bed bug, the first evidence of a close relationship between bed bugs and humans (Pagiotakopkopulu and Buckland, 1999). The earliest mentions of the species are found in ancient Greek writings, e.g. *Historia Animalium* classification

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system of Aristotle from the 4th-century BC, in Roman writings, in Egyptian papyrus from the 3rd-century BC, in the Jewish Talmud (Strouhal, 1997; Pagiotakopulu and Buckland, 1999).
According to Busvine (1980), urbanization and improved living conditions over the last four centuries have allowed the expansion of this species, which requires temperatures above 13 ^{0}C for reproduction. In western Europe, in the first decades of the 20th century, as a result of the spread of electric heating of houses, infestations with *C. lectularius* increased (Johnson, 1941).
DDT (Dichlorodiphenyltrichloroethane), synthesized by Zedler as early as 1874, played an important role in the control of bedbug populations. The discovery of its insecticidal properties by the Swiss chemist Paul Møller in 1939 enabled its use during and after World War II to control populations of body lice and anopheline mosquitoes, typhus and malaria, respectively; subsequently, it led to the reduction of populations of many harmful phytophagous and hematophagous insects, including bed bugs (Moore and Miller, 2008; Zorrilla-Vaca et al., 2015).
Since the end of the 1990s, there has been a resurgence of infestations in the USA, Canada, Europe, Asia, and Australia, the increase of tourism and international trade, being the main factors favouring the spread of the species (Kolb et al., 2009; Bencheton et al., 2011; Berenger and Parola, 2017; Akhoundi et al., 2020). Snetsinger (1997) notes that until 1997, it was difficult for entomologists in the USA to find specimens for use in practical work with students.
The presence of bed bugs has become a common topic on websites and in television reports in recent years. This is due to the discomfort caused to humans by their resistance to insecticides and their hidden lifestyle, which often makes it difficult to visually discern their presence. Despite the lack of confirmation from studies regarding its role as a vector for pathogens in humans and animals (Hamlili et al., 2023), there has been an observed increase in the incidence of secondary skin infections in the United States and the United Kingdom due to infestation by *C. lectularius* (Ter Poorten and Prose, 2005). Psychological disorders and allergic reaction are also mentioned by many authors as a cause of bed bug attacks (Goddard and de Shazo, 2012; Burrows et al., 2013; Sheele, 2021).
The objective of this study is to analyse the potential for infestation by certain species in Romania, with a particular focus on Pitesti.

2. MATERIALS AND METHODS

Data on the presence of this species at the national level, as well as in Pitesti - located in the south-central part of the country, came from the following sources: discussions with infested people (interactions with students, acquaintances); analysis of the You Tube platform until April 2024 about the presence of bed bugs and recommendations regarding their control at national level; reports of the presence of the species on websites of official institutions (websites were searched manually).
There is no centralization of records of infestation cases by relevant institutions at the national level, but on the official website of the National Institute of Public Health in February 2024 general information about the lifestyle of bed bug and methods of preventing infestation appeared (URL 1).

3. RESULTS AND DISCUSSIONS

a. Report in Romania

Regarding the origin of the species as a parasite of the prehistoric humans on the current territory of Romania, *C. lectularius* has not been emphasized in the studies focusing on the parasites complex of bat species in the Balkan Peninsula countries, including Romania (Decu et al, 2003; Simov et al.,

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2006). It is believed that the humid climate of caves in the Holocene, disliked by this ectoparasite, led to the abandonment of bats as hosts, the bed bug following humans into hut-type dwellings that offered suitable conditions (Davis et al., 2003; Simov et al., 2006).
In 1905, in his paper " Escursiuni zoologice", Nicolae Leon, who founded the first laboratory of Parasitology in Romania, mentioned the bed bug under the old name *Acanthia lectularia* as one of the most widespread hematophagous ectoparasites of humans in our country (Leon, 1905). The parasite was frequently encountered until the early 50's, but it was not reported in the following decades as a result of DDT control, Romania becoming the largest producer of this insecticide at European level. In the past, one of the methods of its removal from the dwellings in our country was gassing with sulphur, HCN, Chloropicrin (Nitzulescu and Gherman, 1990). In rural areas, disinfection of furniture with kerosene gas was practiced (oral communication).
If the first reports of the return of bed bugs to the USA and Europe date back to the late 1990s, in Romania, the records are more recent. An analysis of video materials on the You Tube platform regarding the presence of the species and recommendations for its control in our country revealed the first report in 2013 (Fig. 1). Five years ago, a growing presence of materials dedicated to this topic indirectly reflected an increase in infestation cases, with an explosion in the last two years.
It is possible that the species was present prior to report from 2013, because people may have been hesitant to admit or discuss seeing them in their homes.

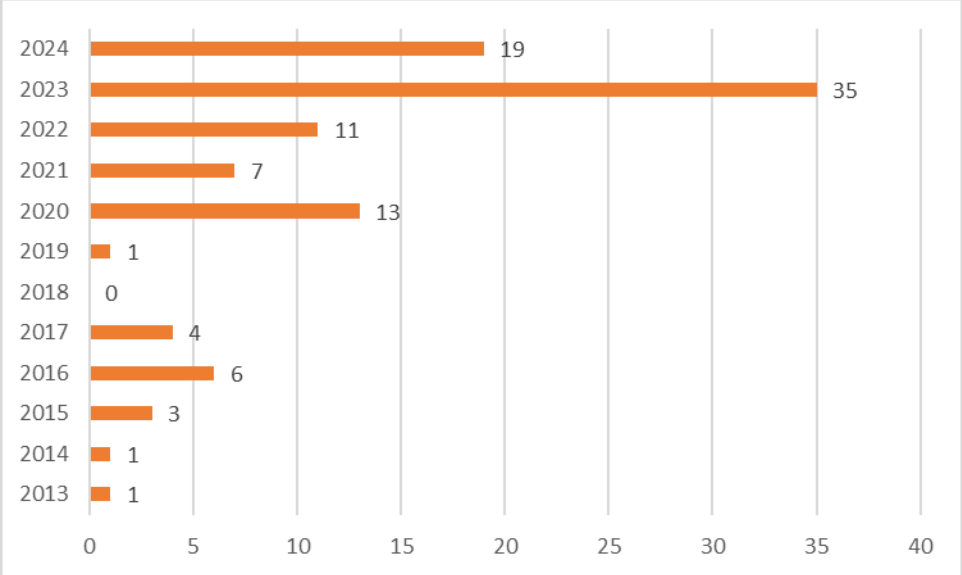

Figure 1. Number of YouTube video materials about the Cimex lectularius in Romania

b. Report in Pitesti

In Pitesti there have been several reports of bed bug infestation in recent years.
Case 1. In 2019, a student presented to the Entomology laboratory with two specimens captured from the mattress of the room where he lives with rent. It also showed sting marks on the forelimb (Fig. 2a). A microscopic examination identified the species as *C. lectularius*.
Case 2. Between 2021-2023, some students reported the presence of the parasite in their dwellings following the purchase of second-hand furniture (beds, in particular), which is the reason why they

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experience stings produced by specimens hidden in beds. Second-hand furniture and clothing as pathways of bed bugs infestation are mentioned by Delaunay (2012).

Case 3. In 2023, while renting a living space a student was exposed to bed bug bites. Initially, food poisoning was suspected as she presented with a rash of urticarial papules on the body surface associated with intense pruritus. Following consultation with the family doctor and identification of the bed bugs on the mattress, a correct diagnosis was reached. As can be seen in Figure 2b, the stings occurred mainly on the forearm. Ter Poorten and Prose (2005) describe a similar case with a rash of urticarial, erythematous papules recorded on the face, neck and extremities of a child. Moreover, the immune response depends on the individual sensitivity to the substances contained in the saliva of the bed bugs (Kolb et al., 2009).

Case 4. The development of tourism has increased the potential for infestation, with travelers being exposed to the risk of infestation of personal belongings and subsequent contamination of their own homes (Delaunay, 2012). Such a situation was reported by a tourist family from Pitesti, who, during their vacation in the summer of 2023 in the coastal area (Constanţa District), was confronted with pricking of the extremities and torso due to a bed bugs infestation in the room (Fig. 2c; 3).

a b c

Figure 2. Cimex lectularius – bites on the body

c. Report in Bucharest

The presence of bed bugs also affects public institutions. An online advertisement in the summer of 2023 mentions the closure of the National Library of Romania for pest control activities (URL 2). Furthermore, a multinational company known in the commercialization of furniture items was, at the beginning of February 2024, at the center of media attention due to the suspicion of the presence of bed bugs in one of the store's warehouses (URL 3).

Recently, a school in Bucharest was in the center of attention due to the presence of bed bugs in classrooms, a situation reported by the parents (URL 4).

The presence of the parasite in homes leads to unusual situations. Thus, personal discussions have highlighted cases in which some landlords in Bucharest preferred to sell their infested apartments or

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cases in which people who wanted to leave the infested apartments where they were renting were refused by the new owners (oral communications).

There is no centralized record of infestation cases by the relevant Romanian institutions at the national level, and Harlan (2006) notes the same disinterest of public health or government agencies in the USA in their duty to report infestations. It is furthermore worth of notice that recognizing infestation of dwellings can be seen as social stigma, so that many people are reluctant to provide data about this ectoparasite (Usinger 1966, Krinsky 2019).

a b

Figure 3. Cimex lectularius – adults and larvae on bed mattresses

4. CONCLUSIONS

The cosmopolitan distribution with high incidence in certain areas, maintains the interest of the scientific community for this human ectoparasite that accompanied mankind throughout its evolution, when caves were established as shelters. Although studies have not confirmed its role as a vector for human and animal pathogens, the bed bug is of medical importance since the bites cause allergies, dermatological, and psychological disorders.

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6. REFERENCES

Akhoundi, M., Sereno, D., Durand, R., Mirzaei, A., Bruel, C., Delaunay, P., Marty, P., Izri, A. (2020). Bed Bugs (Hemiptera, Cimicidae): Overview of Classification, Evolution and Dispersion. *International Journal of Environmental Research and Public Health, 17(12),* 4576. Retrieved April 25, 2024, from https://doi.org/10.3390/ijerph17124576

Bencheton, A.L., Berenger, J.M., Del Giudice P., Delaunay, P., Pages, F., Morand, J.J. (2011). Resurgence of bedbugs in southern France: a local problem or the tip of the iceberg? *Journal of the European Academy of Dermatology*

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and Venereology, 25(5), 599-602. Retrieved March 10, 2024, from https://doi.org/10.1111/j.1468-3083.2010.03804.x

Berenger, J-M., Parola, P. (2017). Arthropod Vectors of Medical Importance - 12. In: Infectious Diseases (Fourth Edition), 1, 104-112. Retrieved February 14, 2024, from https://doi.org/10.1016/B978-0-7020-6285-8.00012-5

Burrows, S., Perron, S., Susser, S. (2013). Suicide following an infestation of bed bugs. *The American journal of case reports, 14,* 176–178. Retrieved June 11, 2024, from https://doi.org/10.12659/AJCR.883926

Busvine, J.R. (1980). Insects and hygiene. 'The biology and control of insect pests of medical and domestic importance. 3rd edition. London: Chapman and Hall, 576 pp.

Chebbah, D., Elissa, N., Sereno, D., Hamarsheh, O., Marteau, A., Jan, J., Izri, A., Akhoundi, M. (2021). Bed Bugs (Hemiptera: Cimicidae) Population Diversity and First Record of Cimex hemipterus in Paris. *Insects, 12,* 578. Retrieved April 25, 2024, from https://doi.org/10.3390/insects12070578

Davis, B.A.S., Brewer, S., Stevenson, A.C., Guiot, J. (2003). The temperature of Europe during the Holocene reconstructed from pollen data. *Quaternary Science Reviews, 22,* 1701–1715.

Decu, V., Murariu, D., Gheorghiu, V. (2003) Chiroptere din România. Institutul de Speologie "Emil Racoviţă", Bucureşi, 521 pp

Delaunay P. (2012). Human travel and traveling bedbugs. *Journal of Travel Medicine, 19(6),* 373–379. Retrieved February 12, 2024, from https://doi.org/10.1111/j.1708-8305.2012.00653.x

Goddard, J., de Shazo, R. (2012). Psychological effects of bed bug attacks (Cimex lectularius L.). *The American journal of medicine, 125(1),* 101–103. Retrieved June 11, 2024, from https://doi.org/10.1016/j.amjmed.2011.08.010

Hamlili, F.Z., Bérenger, J.M., Parola, P. (2023). Cimicids of Medical and Veterinary Importance. *Insects, 14,* 392. Retrieved April 21, 2024, from https://doi.org/10.3390/insects14040392

Harlan, H. (2006). Bed Bugs 101: the Basics of Cimex lectularius. *American Entomologist, 52(2),* 99-101. Retrieved March 10, 2024, from https://consensus.fsu.edu/DACS/bbwg/Bed%20Bugs%20101%20(harlan).pdf

Johnson C. G. (1941). The ecology of the bed-bug, Cimex lectularius L., in Britain: Report on Research, 1935-40. *The Journal of hygiene, 41(4),* 345–461. Retrieved June 11, 2024, from https://doi.org/10.1017/s0022172400012560

Kolb, A., Needham, G. R., Neyman, K. M., High, W. A. (2009). Bedbugs. *Dermatologic Therapy, 22(4),* 347–352. Retrieved May 8, 2024, from https://doi.org/10.1111/j.1529-8019.2009.01246.x

Krinsky, W. (2019). Chapter 8. True bugs. In G. Mullen, L. Durden, eds, Medical and Veterinary Entomology (pp. 119-124). London: Academic Press, UK.

Leon, N. (1905). Escursiuni zoologice, [Zoological excursions]. Ed. Minerva, Bucureşti, 166 pp.

Masini, P., Zampetti, S., Miñón Llera, G., Biancolini, F., Moretta, I., Romani, R., Tramontana, M., Hansel, K., Stingeni, L. (2020). Infestation by the tropical bedbug Cimex hemipterus (Hemiptera: Cimicidae): first report in Italy. *Journal of the European Academy of Dermatology and Venereology:JEADV, 34(1),* e28–e30. Retrieved January 23, 2024, from https://doi.org/10.1111/jdv.15876

Moore D.J., Miller D.M. (2008). Field evaluations of insecticide treatment regimens for control of the common bed bug, Cimex lectularius (L.) *Pest Manag. Sci., 65,* 332–338. Retrieved February 2, 2024, from https://bedbugs.opirg-gripo.ca/wp-content/uploads/2023/02/Resistance-aux-insecticides-et-approche-integree.pdf

Nitzulescu, V. Gherman I. (1990). Entomologie medicală, [Medical Entomology]. Ed. Academiei Române, Bucuresti, 176 pp.

Panagiotakopulu, E., Buckland, P. C. (1999). Cimex lectularius L., the common bed bug from Pharaonic Egypt. Antiquity, 73(282), 908-911.

Sheele J. M. (2021). Association between bed bugs and allergic reactions. *Parasite immunology, 43(7),* e12832. Retrieved June 7, 2024, from https://doi.org/10.1111/pim.12832

Simov, N., Ivanova, T., Schunger, I. (2006). Bat-parasitic Cimex species (Hemiptera: Cimicidae) on the Balkan Peninsula, with zoogeographical remarks on Cimex lectularius Linnaeus. *Zootaxa, 1190 (1),* 59–68.

Snetsinger, R. (1997). Chapter 9. Bed Bugs & Other Bugs. In S. Hedges, ed., Mallis' Handbook of Pest Control, 8th ed. (392–424) Cleveland, OH: GIE Publ., Inc., Cleveland.

Strouhal, E. (1997). Life of the Ancient Egyptians. Second paperback edition, Liverpool: Liverpool University Press and Opus Publishing, Liverpool and London. 279 pp.

Zorrilla-Vaca, A., Silva-Medina, M.M., Escandón-Vargas, K. (2015). Bed bugs, Cimex spp.: Their current world resurgence and healthcare impact. *Asian Pac. J. Trop. Dis. 5,* 342–352.

Usinger, R.L. (1966). Monograph of Cimicidae (Hemiptera-Heteroptera). *Entomological Society of America,* Annapolis, MD, USA.

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Ter Poorten, M.C., Prose, N.S. (2005). The return of the common bedbug. *Pediatr Dermatol., 22(3)*, 183-187. Retrieved January 23, 2024, from https://doi.org/10.1111/j.1525-1470.2005.22301.x
URL 1. https://insp.gov.ro/2024/02/19/informare-privind-combaterea-plosnitelor/
URL 2. https://www.romania-insider.com/romania-national-library-advances-temporary-closure-bedbugs-2023
URL 3. https://adevarul.ro/economie/plosnite-la-ikea-care-magazin-este-infestat-si-ce-2336705.html
URL 4. https://adevarul.ro/stiri-locale/bucuresti/scoala-din-capitala-infestata-cu-plosnite-2348721.html).

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